WO 2005/006949

SEO ID NO: 1. RAG1 Nucleotide Sequence

gagagcagag aacacacttt gccttctctt tggtattgag taatatcaac caaattgcag acatctcaac actttggcca ggcagcetge tgagcaaggt accteageea geatggeage etettteeea eceaeettgg gaeteagtte tgecccagat gaaatteage acceacatat taaattttea gaatggaaat ttaagetgtt eegggtgaga teetttgaaa agacacetgaagaageteaa aaggaaaaga aggatteett tgaggggaaa eeetetetgg ageaateteeageagteetg gacaaggetg atggtcagaa gccagtccca actcagccat tgttaaaagc ccaccctaag ttttcaaaga aatttcacga caacgagaaa gcaagaggca aagcgatcca tcaagccaac ettegacate tetgeegcat etgtgggaat tettttagag ctgatgagca caacaggaga tatccagtcc atggtcctgt ggatggtaaa accctaggcc ttttacgaaa gaaggaaaag agagetaett eetggeegga eeteattgee aaggttttee ggategatgt gaaggeagat gttgaetega teeaeeeeae tgagttetge cataactget ggageateat geacaggaag tttageagtg eeceatgtga ggtttaette eegaggaaeg tgaccatgga gtggcacccc cacacaccat cctgtgacat ctgcaacact gcccgtcggg gactcaagag gaagagtett eageeaaact tgeageteag caaaaaaete aaaaetgtge ttgaccaage aagaeaagee egteagegea agagaagage teaggeaagg ateageagea aggatgteat gaagaagate geeaactgea gtaagataca tettagtace aageteettg cagtggactt eccagageae tttgtgaaat ceateteetg ceagatetgt gaacacatte tggetgaece tgtggagaec aactgtaage atgtettttg eegggtetge atteteagat geeteaaagt catgggcage tattgteect ettgeegata tecatgette cetaetgace tggagagtee agtgaagtee tttetgageg tettgaatte cetgatggtg aaatgteeag caaaagagtg caatgaggag gteagtttgg aaaaatataa teaceacate tcaagtcaca aggaatcaaa agagattttt gtgcacatta ataaaggggg ccggcccgc caacatcttc tgtcgctgac tcggagaget cagaageace ggetgaggga getcaagetg caagtcaaag cetttgetga caaagaagaa ggtggagatg tgaagtccgt gtgcatgacc ttgttcctgc tggctctgag ggcgaggaat gagcacaggc aagctgatga getggaggee atcatgeagg gaaagggete tggeetgeag eeagetgttt gettggeeat ccgtgtcaac accttectea getgcagtea gtaccacaag atgtacagga etgtgaaage catcacaggg agacagattt ttcagccttt gcatgccctt cggaatgctg agaaggtact tctgccaggc taccaccact ttgagtggca gccacctctg aagaatgtgt etteeageae tgatgttgge attattgatg ggetgtetgg actateatee tetgtggatg attaceeagt ggacaccatt gcaaagaggt tccgctatga ttcagctttg gtgtctgctt tgatggacat ggaagaagac atcttggaag gcatgagatc ccaagacctt gatgattacc tgaatggccc cttcactgtg gtggtgaagg agtcttgtga tggaatggga gacgtgagtg agaagcatgg gagtgggcct gtagttccag aaaaggcagt ccgtttttca ttcacaatca tgaaaattac tattgcccac ageteteaga atgtgaaagt atttgaagaa gecaaaceta aetetgaaet gtgttgcaag eeattgtgee ttatgctggc agatgagtct gaccacgaga cgctgactgc catcctgagt cctctcattg ctgagaggga ggccatgaag agcagtgaat taatgettga getgggagge atteteegga ettteaagtt eatetteagg ggeaeegget atgatgaaaa acttgtgcgg gaagtggaag gcctcgaggc ttctggctca gtctacattt gtactctttg tgatgccacc cgtctggaag ceteteaaaa tettgtette eactetataa eeagaageea tgetgagaae etggaaegtt atgaggtetg gegtteeaae cettaccatg agtetgtgga agaactgegg gategggtga aaggggtete agetaaacet tteattgaga eagteeette catagatgca ctccactgtg acattggcaa tgcagctgag ttctacaaga tcttccagct agagataggg gaagtgtata agaateecaa tgetteeaaa gaggaaagga aaaggtggea ggeeacaetg gacaageate teeggaagaa gatgaacctc aaaccaatca tgaggatgaa tggcaacttt gccaggaagc tcatgaccaa agagactgtg gatgcagttt gtgagttaat teetteegag gagaggeaeg aggetetgag ggagetgatg gatetttaee tgaagatgaa accagtatgg cgatcatcat gccctgctaa agagtgccca gaatccctct gccagtacag tttcaattca cagcgttttg ctgagctcct ttctacgaag ttcaagtata ggtatgaggg aaaaatcacc aattattttc acaaaaccct ggcccatgtt cctgaaatta ttgagaggga tggctccatt ggggcatggg caagtgaggg aaatgagtct ggtaacaaac tgtttaggcg cttccggaaa atgaatgcca ggcagtccaa atgctatgag atggaagatg tcctgaaaca ccactggttg tacacctcca aatacctcca gaagtttatg aatgctcata atgcattaaa aacctctggg tttaccatga accctcaggc aagcttaggg gacccattag gcatagagga ctctctggaa agccaagatt caatggaatt ttaagtaggg caaccactta tgagttggtt tttgcaattg agtttccctc tgggttgcat tgagggettc tcctagcacc ctttactgct gtgtatgggg cttcaccatc caagaggtgg taggttggag taagatgcta cagatgctct caagtcagga atagaaactg atgagctgat tgcttgaggc ttttagtgag ttccgaaaag caacaggaaa aatcagttat ctgaaagctc agtaactcag aacaggagta actgcagggg accagagatg agcaaagatc tgtgtgtgtt ggggagctgt catgtaaatc aaagccaagg ttgtcaaaga acagccagtg WO 2005/006949 PCT/US2004/021646

aggccagaaa ttggtcttgt ggttttcatt tttttccccc ttgattgatt atattttgta ttgagatatg ataagtgcct tctatttcat ttttgaataa ttcttcattt ttataatttt acatatcttg gcttgctata taagattcaa aagagctttt taaatttttc taataatatc ttacatttgt acagcatgat gacctttaca aagtgctctc aatgcattta cccattcgtt atataaatat gttacatcag gacaactttg agaaaatcag teettittta tgtttaaatt atgtatetat tgtaacette agagtttagg aggicatetg etgicatgga titticaata atgaatitag aatacacetg tiagetacag tiagtiatta aatetietga taatatatgt ttacttaget atcagaagec aagtatgatt etttattitt aettitteat tteaagaaat ttagagttte caaatttaga gettetgeat acagtettaa agecacagag gettgtaaaa atataggtta gettgatgte taaaaatata tttcatgtct tactgaaaca ttttgccaga ctttctccaa atgaaacctg aatcaatttt tctaaatcta ggtttcatag agtectetee tetgeaatgt gttattettt etataatgat eagtttaett teagtggatt eagaattgtg tageaggata accttgtatt tttccatccg ctaagtttag atggagtcca aacgcagtac agcagaagag ttaacattta cacagtgctt tttaccactg tggaatgttt tcacactcat ttttccttac aacaattctg aggagtaggt gttgttatta tctccatttg atgggggttt aatgatttgc tcaaagtcat ttaggggtaa taaatacttg gcttggaaat ttaacacagt ccttttgtct ccaaagccet tettetttee accacaaatt aateactatg tttataaggt agtateagaa tttttttagg atteacaact aatcactata gcacatgacc ttgggattac atttttatgg ggcaggggta agcggctttt aaatcatttg tgtgctctgg ctcttttgat agaagaaagc aacacaaaag ctccaaaggg ccccctaacc ctcttgtggc tccagttatt tggaaactat gatetgeate ettaggaate tgggatttge eagttgetgg eaatgtagag eaggeatgga attttatatg etagtgagte ataatgatat gttagtgtta attagttttt etteetttga ttttattgge cataattget aetetteata cacagtatat caaagagett gataatttag ttgtcaaaag tgcateggeg acattatett taattgtatg tatttggtge ttettcaggg attgaactca gtatctttca ttaaaaaaca cagcagtttt cettgetttt tatatgeaga atateaaagt catttetaat ttagttgtca aaaacatata catattttaa cattagtttt tttgaaaact cttggttttg tttttttgga aatgagtggg ccactaagcc acactttccc ttcatcctgc ttaatccttc cagcatgtct ctgcactaat aaacagctaa attcacataa tcatcctatt tactgaagca tggtcatgct ggtttataga ttttttaccc atttctactc tttttctcta ttggtggcac tgtaaatact ttccagtatt aaattatcct tttctaacac tgtaggaact attttgaatg catgtgacta agagcatgat ttatagcaca acctttccaa taatccctta atcagatcac attitgataa accctgggaa catctggctg caggaatttc aatatgtaga aacgetgeet atggtttttt geeettaetg ttgagaetge aatateetag accetagttt tataetagag ttttattttt agcaatgcct attgcaagtg caattatata ctccagggaa attcaccaca ctgaatcgag catttgtgtg tgtatgtgtg aagtatatet gggaetteag aagtgeaatg tatttttete etgtgaaace tgaatetaea agttttetge caagccactc aggtgcattg cagggaccag tgataatggc tgatgaaaat tgatgattgg tcagtgaggt caaaaggagc cttgggatta ataaacatgc actgagaagc aagaggagga gaaaaagatg tctttttctt ccaggtgaac tggaatttag ttttgcctca gatttttttc ccacaagata cagaagaaga taaagatttt tttggttgag agtgtgggtc ttgcattaca tcaaacagag ttcaaattcc acacagataa gaggcaggat atataagcgc cagtggtagt tgggaggaat aaaccattat ttggatgcag gtggtttttg attgcaaata tgtgtgtgtc ttcagtgatt gtatgacaga tgatgtattc ttttgatgtt aaaagatttt aagtaagagt agatacattg tacccatttt acattttctt attttaacta cagtaatcta cataaatata cctcagaaat catttttggt gattattttt tgttttgtag aattgcactt cagtttattt tcttacaaat aaccttacat tttgtttaat ggcttccaag agcctttttt tttttgtatt tcagagaaaa ttcaggtacc aggatgcaat ggatttattt gattcagggg acctgtattt ccatgtcaaa tgttttcaaa taaaatgaaa tatgagtttc aatacttttt atattttaat atttccttaa tattatggtt attgtccgcc attttgttgt atattgtaaa taaagtttag attgt

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SEQ ID NO: 2.

RAG 1 Amino acid sequence

MAASFPPTLGLSSAPDEIQHPHIKFSEWKFKLFRVRSFEKTPEEAQKEKKDSFEGK PSLEQSPAVLDKADGQKPVPTQPLLKAHPKFSKKFHDNEKARGKAIHQANLRHL CRICGNSFRADEHNRRYPVHGPVDGKTLGLLRKKEKRATSWPDLIAKVFRIDVK ADVDSIHPTEFCHNCWSIMHRKFSSAPCEVYFPRNVTMEWHPHTPSCDICNTAR RGLKRKSLQPNLQLSKKLKTVLDQARQARQRKRRAQARISSKDVMKKIANCSKI HLSTKLLAVDFPEHFVKSISCQICEHILADPVETNCKHVFCRVCILRCLKVMGSY CPSCRYPCFPTDLESPVKSFLSVLNSLMVKCPAKECNEEVSLEKYNHHISSHKES KEIFVHINKGGRPRQHLLSLTRRAQKHRLRELKLQVKAFADKEEGGDVKSVCM TLFLLALRARNEHRQADELEAIMQGKGSGLQPAVCLAIRVNTFLSCSQYHKMYR TVKAITGRQIFQPLHALRNAEKVLLPGYHHFEWQPPLKNVSSSTDVGIIDGLSGL SSSVDDYPVDTIAKRFRYDSALVSALMDMEEDILEGMRSQDLDDYLNGPFTVVV KESCDGMGDVSEKHGSGPVVPEKAVRFSFTIMKITIAHSSQNVKVFEEAKPNSEL CCKPLCLMLADESDHETLTAILSPLIAEREAMKSSELMLELGGILRTFKFIFRGTG YDEKLVREVEGLEASGSVYICTLCDATRLEASQNLVFHSITRSHAENLERYEVW RSNPYHESVEELRDRVKGVSAKPFIETVPSIDALHCDIGNAAEFYKIFQLEIGEVY KNPNASKEERKRWQATLDKHLRKKMNLKPIMRMNGNFARKLMTKETVDAVC ELIPSEERHEALRELMDLYLKMKPVWRSSCPAKECPESLCQYSFNSQRFAELLST KFKYRYEGKITNYFHKTLAHVPEIIERDGSIGAWASEGNESGNKLFRRFRKMNA RQSKCYEMEDVLKHHWLYTSKYLQKFMNAHNALKTSGFTMNPQASLGDPLGI **EDSLESQDSMEF**

SEQ ID NO: 3.

RAG2 nucleotide sequence

actetettta cagteageet tetgettgee acagteatag tgggeagtea gtgaatette eecaagtget gacaattaat acctggttta geggeaaaga tteagagagg egtgageage eeetetggee tteagacaaa aatetaegta ccatcagaaa ctatgtetet geagatggta acagteagta ataacatage ettaatteag eeaggettet eaetgatgaa ttttgatgga caagttttet tetttggaca aaaaggetgg eecaaaagat eetgeeecae tggagtttte eatetggatg taaagcataa ccatgtcaaa ctgaagccta caattttctc taaggattcc tgctacctcc ctcctcttcg ctacccagcc acttgcacat tcaaaggcag cttggagtet gaaaagcatc aatacatcat ccatggaggg aaaacaccaa acaatgaggt ttcagataag atttatgtca tgtctattgt ttgcaagaac aacaaaaagg ttacttttcg ctgcacagag aaagacttgg taggagatgt teetgaagee agatatggte atteeattaa tgtggtgtae ageegaggga aaagtatggg tgetetettt ggaggacget catacatgec ttetacecae agaaceacag aaaaatggaa tagtgtaget gactgeetge cetgtgtttt cetggtggat tittgaattig ggtgtgetae ateataeatt etteeagaae tieaggatgg getatettit eatgteteta ttgccaaaaa tgacaccatc tatattttag gaggacattc acttgccaataatatccggc ctgccaacct gtacagaata agggttgate tteecetggg tageceaget gtgaattgea eagtettgee aggaggaate tetgteteea gtgeaateet gactcaaact aacaatgatg aatttgttat tgttggtggc tatcagcttg aaaatcaaaa aagaatgatc tgcaacatca tetetttaga ggacaacaag atagaaatte gtgagatgga gaccecagat tggaccecag acattaagca cagcaagata tggtttggaa gcaacacggg aaatggaact gtttttcttg gcataccagg agacaataaa caagttgttt cagaaggatt ctatttetat atgttgaaat gtgetgaaga tgataetaat gaagageaga caacatteae aaacagteaa acateaacag aagatecagg ggattecact eeetttgaag actetgaaga atttigttte agtgeagaag eaaatagttt tgatggtgat gatgaatttg acacctataa tgaagatgat gaagaagatg agtctgagac aggctactgg attacatgct gccctacttg tgatgtggat atcaacactt gggtaccatt ctattcaact gagctcaaca aacccgccat gatctactgc tctcatgggg atgggcactg ggtccatgct cagtgcatgg atctggcaga acgcacactc atccatctgt cagcaggaag caacaagtat tactgcaatg agcatgtgga gatagcaaga gctctacaca ctccccaaag agtcctaccc ttaaaaaagc ctccaatgaa atccctccgt aaaaaaggtt ctggaaaaat cttgactcct gccaagaaat cctttcttag aaggttgttt gattagtttt gcaaaagcet ttcagattca ggtgtatgga atttttgaat ctatttttaa aatcataaca ttgattttaa aaatacattt ttgtttattt aaaatgeeta tgttttetti tagttaeatg aattaaggge cagaaaaaag tgtttataat geaatgataa ataaagtcat tetagaeeet ataeattttg aaaatatttt aeeeaaatae teaatttaet aatttattet teaetgagga tttetgatet gattitttat teaacaace ttaaacaece agaageagta ataateateg aggtatgttt atatttatta tatgagtett ggtaacaaat aacetataaa gtgtttatga caaatttage caataaagaa attaacacce aaaagaatta aattgattat tttgtgcaac ataacaattc ggcagttggc caaaacttaa aagcaagatc tactacatcc cacattagtg ttetttatat acetteaage aaceetttgg attatgeeea tgaacaagtt agttteteat agetttacag atgtagatat aaatataaat atatgtatac atatagatag ataatgttet ecactgacac aaaagaagaa ataaataate tacatcaaaa aaaaaaaaaa aaaaaaaaaa aaaa

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SEQ ID NO: 4. RAG 2 Amino Acid Sequence

MSLQMVTVSNNIALIQPGFSLMNFDGQVFFFGQKGWPKRSCPTGVFHLDVKHN
HVKLKPTIFSKDSCYLPPLRYPATCTFKGSLESEKHQYIIHGGKTPNNEVSDK
IYVMSIVCKNNKKVTFRCTEKDLVGDVPEARYGHSINVVYSRGKSMGALFG
GRSYMPSTHRTTEKWNSVADCLPCVFLVDFEFGCATSYILPELQDGLSFHVS
IAKNDTIYILGGHSLANNIRPANLYRIRVDLPLGSPAVNCTVLPGGISVSSAIL
TQTNNDEFVIVGGYQLENQKRMICNIISLEDNKIEIREMETPDWTPDIKHSKI
WFGSNTGNGTVFLGIPGDNKQVVSEGFYFYMLKCAEDDTNEEQTTFTNSQT
STEDPGDSTPFEDSEEFCFSAEANSFDGDDEFDTYNEDDEEDESETGYWITC
CPTCDVDINTWVPFYSTELNKPAMIYCSHGDGHWVHAQCMDLAERTLIHLS
AGSNKYYCNEHVEIARALHTPQRVLPLKKPPMKSLRKKGSGKILTPAKKSF
LRRLFD

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SEQ ID NO: 5. CD154 nucleotide sequence

1 cttctctgcc agaagatacc atttcaactt taacacagca tgatcgaaac atacaaccaa 61 acttctcccc gatetgegge caetggaetg eccateagea tgaaaatttt tatgtattta 121 cttactgttt ttcttatcac ccagatgatt gggtcagcac tttttgctgt gtatcttcat 181 agaaggttgg acaagataga agatgaaagg aatcttcatg aagattttgt attcatgaaa 241 acgatacaga gatgcaacac aggagaaaga teettateet tactgaactg tgaggagatt 301 aaaagccagt ttgaaggctt tgtgaaggat ataatgttaa acaaagagga gacgaagaaa 361 gaaaacagct ttgaaatgca aaaaggtgat cagaatcctc aaattgcggc acatgtcata 421 agtgaggcca gcagtaaaac aacatetgtg ttacagtggg ctgaaaaagg atactacacc 481 atgagcaaca acttggtaac cctggaaaat gggaaacagc tgaccgttaa aagacaagga 541 ctetattata tetatgecca agteacette tgtteeaate gggaagette gagteaaget 601 ccatttatag ccagcctctg cctaaagtcc cccggtagat tcgagagaat cttactcaga 661 getgeaaata eecacagtte egecaaacet tgegggeaac aatecattea ettgggagga 721 gtatttgaat tgcaaccagg tgcttcggtg tttgtcaatg tgactgatcc aagccaagtg 781 agccatggca etggetteae gteetttgge ttaeteaaae tetgaaeagt gteaeettge 841 aggetgtggt ggagetgaeg etgggagtet teataataea geaeageggt taageceaee 901 ccctgttaac tgcctattta taaccctagg atcctcctta tggagaacta tttattatac 961 actecaagge atgtagaact gtaataagtg aattacaggt cacatgaaac caaaacggge 1021 cetgetecat aagagettat atatetgaag eageaacece aetgatgeag acateeagag 1081 agtectatga aaagacaagg ceattatgea eaggttgaat tetgagtaaa eageagataa 1141 cttgccaagt tcagttttgt ttctttgcgt gcagtgtctt tccatggata atgcatttga 1201 tttatcagtg aagatgcaga agggaaatgg ggagcctcag ctcacattca gttatggttg 1261 actetgggtt cetatggeet tgttggaggg ggeeaggete tagaaegtet aacaeagtgg 1321 agaaccgaaa cccccccc ccccccgcc accctctcgg acagttattc attetettte 1381 aatetetete tetecatete tetettteag tetetetete teaacetett tetteeaate 1441 tetetttete aatetetetg tttecetttg teagtetett eeeteecea gtetetette 1501 teaateece tttetaacae acacacae acacacaea acacacaea acacacaea 1561 acacacaca acacacaca agagtcagge egttgetagt cagttetett etttecacee 1621 tgtccctatc tctaccacta tagatgaggg tgaggagtag ggagtgcagc cctgagcctg 1681 cccactcctc attacgaaat gactgtattt aaaggaaatc tattgtatct acctgcagtc 1741 tccattgttt ccagagtgaa cttgtaatta tcttgttatt tattttttga ataataaaga 1801 cctcttaaca ttaaaa

SEQ ID NO: 6. CD154 ar

CD154 amino acid sequence

MIETYNQTSPRSAATGLPISMKIFMYLLTVFLITQMIGSALFAVYLHRRLDKIEDE RNLHEDFVFMKTIQRCNTGERSLSLLNCEEIKSQFEGFVKDIMLNKEETKKENSF EMQKGDQNPQIAAHVISEASSKTTSVLQWAEKGYYTMSNNLVTLENGKQLTVK RQGLYYIYAQVTFCSNREASSQAPFIASLCLKSPGRFERILLRAANTHSSAKPCGQ QSIHLGGVFELQPGASVFVNVTDPSQVSHGTGFTSFGLLKL